Claims

1. Method for manufacturing bent hollow bodies (10g) with inner and outer arcs forming inner arc wall regions (62) and outer arc wall regions (61), whereby a starting hollow body is bent and, using one or more high internal pressure (HIP) forming process steps, is transformed in an HIP tool (22, 32) to its final cross-sectional shape, whereby the starting hollow body exhibits a readily bent cross-section at least in the region to be bent, in which by means of specific cross-sectional shaping, wall material lies closer to the neutral stress plane with reference to bending stresses than in the final cross-sectional shape,

characterised in that,

the HIP tool (22, 32) contains a slide element 21 that is moveable in the inner arc wall region (62) of the bent starting hollow body (10a), makes contact at least with part of the surface area of the inner arc wall region (62), and is withdrawn during the HIP process in the inner arc wall region (62) in the direction of the bend opening, with the result that the inner arc wall region (62) of the bent starting hollow body (10a, 10e) is displaced in the direction of the withdrawing slide element (21) by the action of the high internal pressure.

2. Method according to claim 1, characterised in that the withdrawal of the slide element (21) and the high internal pressure are controlled in such a manner that wall material flows along the surface of the slide element (21) from the inner arc wall region (62) in the direction of the adjacent, bending distal wall zone (67a, 67b) of the hollow body.

3. Method according to one of the claims 1 to 2, characterised in that the hollow body in the outer arc wall region (61) is shape-formed into the final cross-sectional shape and, subsequently, the slide element (21) is withdrawn from the inner arc wall range (62).

4. Method according to one of the claims 1 to 3, characterised in that by means of the withdrawing slide element (21) the inner arc wall range (62) of the bent

starting hollow body is shape-formed to or close to the cross-sectional shape of the final hollow body (10g) and, by means of a further HIP process, the hollow body is transformed to the shape of the final hollow body (10g) in a further tool having the cross-sectional shape of the final hollow body (10g).

5. Method according to one of the claims 1 to 4, characterised in that at least in the inner arc wall region (62) the bent starting hollow body (10a) exhibits a recess which, viewed from outside, is concave in form.

6. Method according to one of the claims 1 to 5, characterised in that the bent starting hollow body is a simple hollow section, whereby the readily bent cross-sectional shape preferably exhibits two recesses that are counter to each other in shape and form a necking region.

7. Method according to one of the claims 1 to 6, characterised in that the final hollow body (10g) is a simple hollow section, preferably a tube-shaped hollow section, in particular a tube-shaped hollow section with a circular or oval cross-section at the end.

8. Method according to one of the claims 1 to 7, characterised in that the hollow body is a hollow body of metal, preferably aluminium or an aluminium alloy, and the ratio B of the average bending radius R_m to the outer diameter D of the bent final hollow body lies in the range:

$0.5 \leq R_m/D \leq 2$, in particular in the range of $0.7 \leq R_m/D \leq 1$.

9. Method according to one of the claims 1 to 8, characterised in that the bending angle of the bent final hollow body lies in the range of 40° to 180° (degrees of angle), preferably in the range 60° to 180° and in particular in the range 90° to 180°.

10. Device for forming bent starting hollow bodies (10a) to a final cross-sectional shape or a cross-sectional shape approaching that of the final hollow section using a high internal pressure (HIP) process, whereby the starting hollow body (10a) exhibits a readily bent cross-section at least in the region to be bent, in which by means of specific cross-sectional shaping, wall material lies closer to the neutral stress plane with reference to bending stresses than

in the final cross-sectional shape, containing an HIP tool (32) which accommodates the bent starting hollow body (10a),

characterised in that,

the HIP tool (32) contains a slide element (21) situated in the inner arc wall region (62) of the bent starting hollow body (10e), and the slide element (21) can be withdrawn in the direction of the bend opening.

11. Device according to claim 10, characterised in that the shape-forming tool is a multi-part tool with upper (32a) and lower (32b) halves and a slide element (21).

12. Device according to one of the claims 10 to 11, characterised in that the slide element (21) lies in a supportive manner at least on part of the surface of the inner arc wall region (62).

13. Device according to one of the claims 10 to 12, characterised in that the bent starting hollow body (10a) exhibits a recess at least in the inner arc wall region and face of the slide element (21) facing the inner arc wall region (62) of the starting hollow body has a convex shape which is counter-identical to that of the recess.

14. Device according to one of the claims 10 to 13, characterised in that in plan view the slide element (21) is tongue-shaped.

15. Use of the process according to claim 1 for producing air intake manifolds for internal combustion engines, for automobile body parts, engine suspensions, chassis components, components for exhaust gas units and pipelines of all kinds.